

# BioFacts

Fueling a  
Stronger Economy

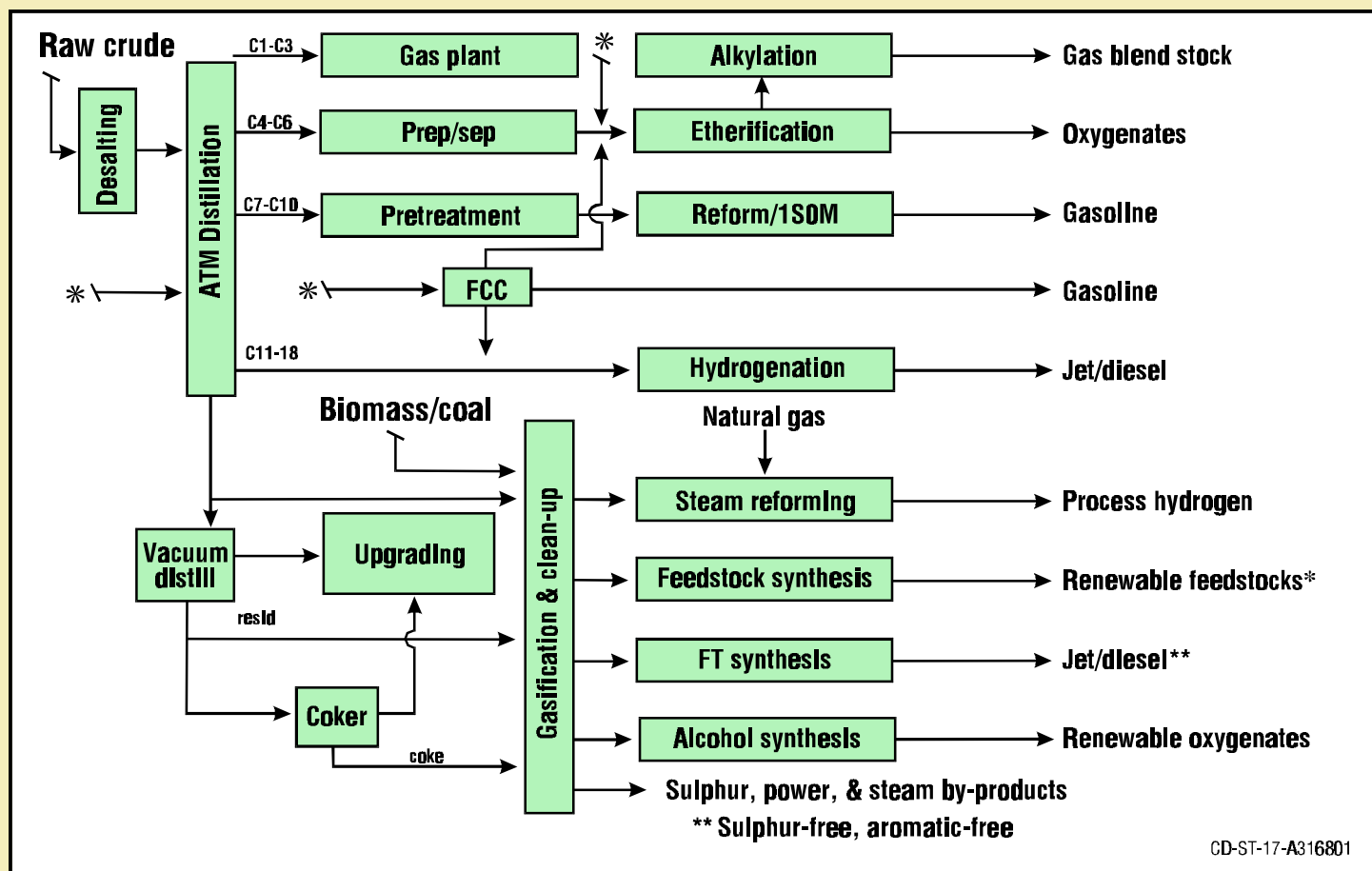
## Renewable Fuel Solutions for Petroleum Refineries

*This schematic illustrates how biomass, coke, residuals, coal, natural gas, and other materials could be used as valuable refinery feedstocks.*

U.S. Department of Energy (DOE), through the National Renewable Energy Laboratory (NREL), is building a bridge between the technologies that produce petroleum products and the technologies that produce renewable fuels. In particular, the DOE Biofuels Program is investigating processes to condition synthesis gas (syngas) produced from the gasification of biomass, coke, waste oils, and other inexpensive feedstocks and low-cost

by-products. Syngas technologies offer refiners economical, flexible solutions to the challenges presented by today's market forces and regulatory environment, such as:

- Increasingly stringent environmental regulations that dictate the composition of petroleum products
- Increasingly sour crudes



- Increased coke production and hydrogen use resulting from heavier crude
- Increased disposal cost for coke and residual oils
- Decreasing hydrogen supply resulting from decreased catalytic reforming severity—a necessity to comply with requirements for reduced aromatic content.

Most importantly, refiners can use the DOE syngas processes to upgrade refinery residuals and coke, which minimizes environmental problems and maximizes profitability. These processes provide refiners with an:

- Alternative source for ultra-clean fuels and fuel additives such as methanol, diesel, and MTBE that meet U.S. Environmental Protection Agency requirements
- Economic source of hydrogen
- Efficient means of sulfur capture
- Economic source of power and steam.

DOE's solution also offers refiners the flexibility to economically supplement petroleum feedstocks with a wide variety of locally available renewable feedstocks that can be fed into the gasifier—feedstocks such as energy crops, municipal solid wastes, many industrial wastes, and agricultural by-products.

Syngas processes can be adapted to satisfy the individual requirements of any refinery.

## Help Build the Bridge to Future Renewable Fuel Solutions

The span of DOE's research goes beyond its national laboratories to cooperative ventures between the laboratories and their industrial partners. We invite you to examine the potential of DOE's syngas conditioning technologies, which complement the oil industry's existing expertise and plant infrastructure.

To learn more about NREL's gasifier development and other DOE Biofuels Program research, please contact us for more information:

Dan Tyndall  
Thermochemical Conversion Project  
303/275-4483

Noni Strawn  
Biofuels Information Center  
303/275-4347

National Renewable Energy Laboratory  
1617 Cole Boulevard  
Golden, CO 80401-3393

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